U.S. Department of Transportation

National Highway Traffic Safety Administration

Memorandum

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NHTSA-99-5100-2

Subject: ACTION: Preliminary Regulatory Evaluation and Regulatory Flexibility Analysis Regarding Seat Belt Positioners

Date: AUG 11 1999

From: William H. Walsh
Associate Administrator
for Plans and Policy

Reply to Attn. of:

To: DOCKET

THRU: Frank Seales, Jr.
Chief Counsel

Please submit the attached two copies of the "Preliminary Regulatory Evaluation and Regulatory Flexibility Analysis, NPRM Regarding Seat Belt Positioners," August 1999, to Docket Number 99 - 5100.

Attachments

DISTRIBUTION:
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National Highway
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PRELIMINARY REGULATORY EVALUATION
AND REGULATORY FLEXIBILITY ANALYSIS

NPRM REGARDING SEAT BELT POSITIONERS

Office of Regulatory
Analysis and Evaluation

Plans and Policy

August 1999

Summary

The Proposal

This Preliminary Regulatory Evaluation and Regulatory Flexibility Analysis accompanies a Notice of Proposed Rulemaking (NPRM) which proposes to require that aftermarket seat belt adjusters be labeled to reflect that these devices should not be used by children less than six years of age.

Benefits

Seat belt positioners can reconfigure the shoulder/lap belt to make the shoulder belt fit comfortably for differing heights of passengers and drivers in vehicles. Making shoulder belts more comfortable could increase belt usage, which leads to increased safety for occupants in the event of a crash. However, some seat belt positioners can cause the lap belt to ride up in a crash and lie across the soft abdominal area, thereby increasing the potential for abdominal injury.

Approximately four percent of passengers misuse seat belts by either putting the shoulder portion of the lap/shoulder belt under the arm or behind the back. Putting the shoulder belt behind the back results in a loss of effectiveness of approximately 15 percent. If these devices are used properly, they might eliminate some of the misuse and loss in effectiveness.

Tests performed with 6-year-old dummies indicate that some seat belt positioners can provide levels of protection roughly equal to a lap/shoulder belt for the HIC, chest g's, and knee excursion measurements taken. However, similar tests with 3-year-old dummies showed that the seat belt positioners tested increased the probability of injury by a significant margin.

Labeling seat belt positioners as not suitable for children under six should reduce the incidence of use of these devices with younger children, while maintaining their availability for children (six years of age and older) and small adults for whom discomfort with regular belts might cause them to misuse or not use existing belt systems.

Costs

The consumer cost of labels would be approximately $0.12 to $0.19 (1998 dollars), for an annual total cost of between $204,000 and $323,000. On the plastic type devices the label could be molded directly into the plastic at minimal cost.

Table of Contents

I - Introduction I-1

Background I-1

Safety Concerns I-3

II - Research 11-1

Three-Year-Old Dummy Test II-2

Six-Year-Old-Dummy Test II-5

5th Percentile Frontal Dummy Tests II-5

Impacts of Positioners on Injury Probability II-7

III - Alternatives III-1

IV - Benefits IV-1

v - c o s t V-1

VI - Regulatory Flexibility Analysis VI-1

VII - Cumulative Impact of Regulations VII-1

Introduction

Aftermarket seat belt positioners are designed to improve the fit of the lap and shoulder belt system on a child or small adult. Their main intent is to move the seat belt away from the face and neck of an occupant. Aftermarket seat belt positioners are not currently subject to any federal motor vehicle safety standard. Because seat belt positioners are generally marketed as child occupant protection devices, there is concern these devices should be subject to the same scrutiny and testing that child restraint systems undergo.

On January 3 1, 1996, the American Academy of Pediatrics petitioned NHTSA to amend Standard 2 13, "Child Restraint Systems," to regulate aftermarket seat belt positioners. AAP's main concern is that these devices appear to interfere with the proper lap and shoulder belt fit by positioning the lap belt too high on the child's abdomen, the shoulder belt too low across the shoulder, and also allowing too much slack in the shoulder belt. As a result, AAP believes that these devices should be subjected to a safety standard that ensures they meet a minimum level of safety.

Background

Seat belt usage for children, ages 5 to 15 years, in passenger vehicles is approximately 65 percent'. Seat belt positioners are marketed as a device to improve seat belt fit and comfort of these individuals. No federal standards apply directly to seat belt positioning devices. Standard 213 (49 CFR 571.213) applies to "any device except Type I or Type II seat belts, designed for use in a motor vehicle or aircraft to restrain, seat, or position children who weigh 50 pounds or less." A seat belt positioner that does not restrain, seat or position children is not a device regulated by Standard 213. Although seat belt positioners are not subject to the standard, their manufacturers

[1] Research Note, National Occupant Protection Use Survey - 1996 Control Intersection Study. U.S. Department of Transportation, National Highway Traffic Safety Administration, August 1997

are subject to the requirements in 49 U.S.C.§§ 30118- 30120 concerning the recall and remedy of products with safety defects.

Safety Standard No. 208, "Occupant Crash Protection" (49 CFR 57 1.208) and Standard 210 (49 CFR 57 1.2 10), "Seat Belt Assembly Anchorages," apply to new completed vehicles. Standard 209 (49 CFR 57 1.209) "Seat Belt Assemblies," applies to new seat belt assemblies. Since an aftermarket seat belt positioner is not installed as part of a completed vehicle or a seat belt assembly, Standards 208, 209 and 210 do not apply.

Since some of the seat belt positioners are made of a cloth-like material, it is possible that the seat belt positioner can be set on fire. Standard No. 302, Flammability of Interior Materials (49 CFR 57 1.302) requires that the material used in the interior of new vehicles, including the seat belts, seat backs and cushions, trim panels, and head liner must comply with the burn resistance requirement to reduce death and injuries in the event of a fire in the vehicle's interior. Aftermarket seat belt positioners are not regulated under Standard 302.

NHTSA is aware of approximately nine manufacturers that produce aftermarket seat belt repositioning devices. Examples of the various types of these devices are: the Child-Safer, a plastic strip that attaches to the lap belt and that has three different openings through which the shoulder belt can be routed; the Safefit, a pouch design through which the lap/shoulder belt is routed; the Seat Belt Adjuster, a plastic clip that attaches to the lap belt, which has a flange

through which the shoulder belt is routed; and the Millennium Child protector, a light weight thermoplastic shield, through which the lap and shoulder belts are routed.

Safety Concerns

The lap belt should fit low and tight over the child's hips, across the top of the thighs, but not on the child's abdomen. The shoulder belt should fit across the shoulder, not across the face or neck. Correct positioning of the lap and shoulder belt is critical. If a child is too small it would be difficult to keep the lap and shoulder belts in their correct positions. Booster seats generally improve belt fit of children ages six to twelve. In the "Study of Older Child Restraint/Booster Seat Fit and NASS Injury Analysis," it was found that for the majority of children tested, better belt fit was observed with the booster seat than with the rear seat alone, regardless of size. A possible cause of poor belt fit for children in the age group six to twelve is the "slouch factor".

Children of these ages often scoot forward in a seat to allow comfortable leg positions rather than sitting up straight and putting pressure on the back of their lower legs. Slouching down like this positions the lap belt higher over their abdomen, and makes the shoulder belt come closer to their face. Booster seats seem to prevent slouching by allowing a comfortable leg position while sitting upright.

Standard No. 208 requires the shoulder belt and the lap belt to intersect off the abdominal area. Any device that moves the intersection from the side to the middle of the abdomen could greatly increase the loading on the occupant's abdomen. Increases in abdominal loading could have

serious safety implications for the wearer of the belt. Realigning the shoulder belt off the shoulder toward the side of the occupant could increase the likelihood that the wearer would twist toward the middle of the vehicle in a crash, so that the person could be partially or completely unrestrained by the shoulder belt. Additionally, slack in the belt system generally introduces more excursion by the occupant, which increase the risk of injury.

Seat belt positioners are relatively new child care safety devices. As a result, there is no crash data available on seat belt positioners. Seat belt positioning devices can cause the lap belt to ride up in a crash and lie across the soft abdominal area instead of staying lower and laying across the child's hips, thereby increasing the potential for abdominal injury, especially for children less than six years of age. Belt adjusters are the closest thing to seat belt positioners. Seat belt adjusters are devices that allow the occupants of the vehicle to adjust the height of the seat belt for maximum comfort. There are usually three adjustment levels when applied at an upper anchorage, full-up position, mid-position and full-down position. Crash data was examined to see if the injuries suffered by children with seat belt adjusters would give some indication of what might happen with seat belt positioners when they are in more prevalent use by children. However, the final rule (59 FR 39472, August 1994) requiring that type 2 safety belts be either 1) integrated with adjustable vehicle seats, or 2) equipped with a means of adjustability to improve belt fit and comfort, was only effective starting September 1, 1997. Thus, this data is very limited and is not statistically significant because of the small number of cases in the data set, and as a result, one is unable to draw any conclusion about the likelihood of injuries due to seat belt adjusters.

Research

Three types of seat belt positioners were tested at the Vehicle Research and Test Center (VRTC)[2]. The three devices were: the Child-Safer, the Safefit, and the Seat Belt Adjuster.

VRTC conducted a series of 35 sled tests using a dynamic test procedure based on the test procedure specified in Standard 213, and test dummies representing a three-year-old and six-year-old child, and a 5th percentile adult female. It is emphasised that these are not compliance tests. The standard seat assembly and test pulse/velocity of Standard 213 were used in test conditions representing a frontal crash, as well as a 15 degree offset condition representing an oblique impact. In the offset condition, the test seat assembly was placed in two different positions, rotated clockwise (occupant faces toward shoulder portion of seat belt) and rotated counter clockwise (occupant faces away from shoulder portion of seat belt).

While these tests are valuable, the dummies do not have the capability of measuring the major concern with these devices-- the potential for abdominal injuries. In order to move the shoulder belt away from the neck, most of these devices pull together the lap and shoulder belts. This moves the shoulder belt away from the neck, but often at the same time moves the lap belt higher, which could cause abdominal injuries.

[2] "Evaluation of Devices to Improve Shoulder Belt Fit," DOT HS **808 383,** Sullivan and Chambers, August 1994.

Three-Year-Old Dummy Test

Table 1 shows the results of testing with the 3-year-old dummy. Results of the tests showed that injury criteria measurements were generally higher when a seat belt positioner was used than when one was not used (baseline). When tested in the baseline configuration, i.e., with no positioners, the HIC values were less than 1000 (the maximum injury criteria allowed) for all dummies. The HIC value for the three-year-old dummy in the baseline/clockwise orientation was a marginal 995.

In tests of the three-year-old dummy in the frontal crash configuration (i.e., the tests comparable to the test configurations specified in Standard 2 13 with seat positioners), the increased chest g's, and head and knee excursions were within the limits. However, HIC of 1,000 was exceeded in two of the seat belt positioners tested, and one test was a borderline 999. In the 3-year-old 15 degree offset clock-wise test, the Safefit exceeded the criterion for the chest g's and all the devices tested exceeded the baseline HIC values and HIC of 1000.

Since virtually all the devices did not provide the FMVSS 2 13 safety performance criteria with the three-year-old dummy, the results indicate that these devices are not suitable for use by children three-years-old. Test dummies representing 4- and 5-year-old children do not exist. The agency thus has no test data to indicate the performance of these devices with children aged four and five. Restraining 4- and 5-year-old children in a vehicle's lap/shoulder belt, with a seat belt positioner, could lead to unnecessary belt-induced injuries. The agency recommends that children of this age be placed in a child restraint, and children too large for a child restraint be placed in a booster seat.

Table 1
Injury Criteria and Excursion for 3-Year-Old Dummy

	Fit Device	HIC	Chest Clip (g)	Head Excursion (mm)	Knee Excursion (mm)
	Limits of Standard 2 13	1000	60	813	915
3 -Year-Old Frontal	Baseline (No Device)	874	48.7	477	553
	Child Safer	1309	55.1	560	615
	SafeFit	1095	56.5	496	618
	Seatbelt Adjuster	999	48.1	551	583
3 -Year-Old 15 Degrees Offset Clock-wise	Baseline (No Device)	995	48.5	411	535
	Child Safer	1565	52.3	564	665
	SafeFit	1435	62.1	486	639
	Seatbelt Adjuster	1238	45.4	452	580

Table 2
Injury Criteria and Excursion for 6-Year-Old Dummy

	Fit Device	HIC	Chest Clip (g)	Head Excursion (mm)	Knee Excursion (mm)
	Limits of Standard 2 13	1000	60	813	915
6-Year-Old Frontal	Baseline (No device)	657	50.4	481	628
	Child Safer	769	65.2	567	674
	SafeFit	427	49.1	566	649
	Seatbelt Adjuster	634	50.8	473	604
6-Year-Old 15 Degrees Offset Clockwise	Baseline (No device)	595	54.3	435	602
	Child Safer	947	67.1	540	661
	SafeFit	621	57.7	461	580
	Seatbelt Adjuster	794	55.1	493	640
6-Year-Old 15 Degrees Offset Counter-clockwise	Baseline (No Device)	409	48.5	516	607
	Child Safer	509	50.1	628	605
	SafeFit	386	42.8	577	589
	Seatbelt Adjuster	374	45.7	554	559

Six-Year-old Dummy Test

Table 2 shows how the devices performed with the 6-year-old dummy. The Child Safer exceeded 60 chest g's in two of the three tests conducted with the six-year-old dummy and had a HIC of 947 in the clockwise offset test. The Safefit and Seatbelt Adjuster had dummy measurements lower than the FMVS S 2 13 injury criteria, but generally had higher head excursion than the baseline tests, while other injury measurements had mixed results (some higher and some lower than the baseline test).

Currently there are no abdominal sensors on the child dummies used by the agency in compliance testing, nor have abdominal injury criteria been developed. Thus, there is no way to evaluate the potential for abdominal injury using the existing test protocols of Standard 2 13. Therefore, if these devices are dynamically tested, one of the primary modes of injuries to children from safety belts can not be measured until the appropriate injury criteria for the abdomen has been developed.

5th Percentile Frontal Dummy Tests

In the VRTC tests (shown in Table 3), the 5th percentile female dummy was instrumented with a neck load cell and tested with and without the belt fit devices. From these tests, seat belt positioning devices generally increased neck load and moments in the 5th percentile female dummy compared to baseline conditions (no device). Standard 213 does not measure neck loading, nor is there accepted injury criterion, at this time, for assessing injury potential. NHTSA is in the process of developing proposals for neck criteria for different dummy sizes,

including the 3-year-old and 6-year-old dummies, as part of its rulemaking for Advanced Air. Bags; also HIC and chest criteria, i.e., different injury criteria for different size dummies. The agency has not decided as yet if these criteria would be applicable to FMVSS 2 13.

Table 3
Neck Loads and Moments for 5th Percentile Female Dummy

	Fit Device*	Neck x-axis Load (N)	Neck z-axis Load (N)#	Neck y-axis Moment (Nm)@
5th Female Frontal	Baseline (No device)	15 56	2463	-34.7/+35.9
	Child Safer	1745	3697	-63.5/+32.6
	SafeFit	1608	2995	-50.5/+29.7
	Seatbelt Adjuster	1460	2771	-42/+2 1.9
15" Offset Clockwise	Baseline (No device)	14 16	2987	-39/+41.3
	Child Safer	2143	3830	-54.8/+18.3
	SafeFit	2002	2724	-38.1/+17.7
	Seatbelt Adjuster	1877	3523	-45/+29.5
15" Offset Counterclockwise	Baseline (No device)	1143	2780	-35/+30.3
	Child Safer	1145	4124	-56.9/+37.4
	SafeFit	1158	2661	-32/+33
	Seatbelt Adjuster	1101	3146	-30/+27.5

Neck z-axis load is tension
@ Negative value is extension; positive value is flexion
Clockwise - occupant rides into shoulder portion of safety belt
Counterclockwise - occupant rides out of shoulder portion of safety belt

Impacts of Positioners on Injury Probability

Given the results of the tests for HIC and Chest Clip (G's) in Tables 1 and 2 , Tables 4 thru 8 show the probability of injury to the three year old and six year old dummies, using the various devices relative to the baseline (no device i.e., lap/shoulder belt only) configuration. In all the tests, the Child Safer had the highest probability of combined head and chest injury to the dummy relative to the baseline. In every configuration, the three year old dummies had the higher increased probability of combined head and chest injury relative to the baseline lap/shoulder belt configuration and relative to the six year old dummies. With the six-year-old dummies, the Seat Belt Adjuster and Safefit had essentially the same combined head and chest injury probability as the baseline lap/shoulder belt configuration.

Table 4
Injury Criteria and Excursion 3-Year-Old Dummy Frontal

	HIC	AIS 4+ *	Chest G's	AIS 4+**	Injury Prob. ***
Baseline	874	11.3%	48.7	26.3%	34.6%
Child safer	1309	38.7%	55.1	32.9%	58.9%
Increased probability of injury		27.4%		6.6%	
Increased Probability of combined head/chest AIS 4+ injury	24.3 %* * * *				

* Probability of injury for AIS 4+ HIC determined by $(1+@EXP((4.9+200/HIC)-0.00351*HIC))^{-1}$
The injury probabilities are based on adults, not on children
** Probability of injury for AIS 4+ chest G's determined from Table 9 and Figure 1. These data were derived in NHTSA'S Final Regulatory Evaluation, Action to Reduce the Adverse Effects of Air Bags, FMVSS No. 208, Depowering, pages II- 12 to II- 14 February 1997.
*** This number is calculated thus: (.113+.263) - (.113 x.263) = .376 - .030 = .346
**** This number is the difference in the injury probabilities: 58.9-34.6=24.3

Table 4(b)

[3] FMVSS No. 201, Upper Interior Head Protection. Final Economic Assessment, Page 4-50. Office of Regulatory Analysis, Plans and Policy June 1995.

Injury Criteria and Excursion for 3-Year-Old Dummy Frontal

	HIC	AIS 4+	Chest G's	AIS 4+	Injury Prob.
Baseline	874	11.3%	48.7	26.3%	34.6%
SafeFit	1095	22.5%	56.5	34.5%	49.2%
Increased probability of injury		11.2%		8.2%	
Increased probability of combined head/chest AIS 4+ injury	.492-.346=14.6%				

Table 4 (c)
Injury Criteria and Excursion for 3-Year-Old Dummy Frontal

	HIC	AIS 4+	Chest G's	AIS 4+	Injury Prob.
Baseline	874	11.3%	48.7	26.3%	34.6%
Seatbelt Adjuster	999	16.9%	48.1	25.7%	38.3%
Increased probability of injury		5.6%		-0.6%	
Increased probability of combined head/chest AIS 4+ injury	0.383- 0.346 =3.7%				

Table5 (a)
Injury Criteria and Excursion for 3-Year-Old Dummy 15 Degrees Offset Clock-wise

	HIC	AIS 4+	Chest G's	AIS 4+	Injury Prob.
Baseline	995	16.7%	48.5	26.1%	38.4%
Child Safer	1565	61.4%	52.3	29.9%	72.9%
Increased probability of injury		44.7%		3.8%	
Increased probability of combined head/chest AIS 4+ injury	.729-.3 84 = 34.5%				

Table 5(b)
Injury Criteria and Excursion for 3-Year-Old Dummy 15 Degrees Offset Clock-wise

	HIC	AIS 4+	Chest G's	AIS 4+	Injury Prob.
Baseline	995	16.7%	48.5	26.1%	38.4%
SafeFit	1435	50.0%	62.1	40.0%	70.0%
Increased probability of injury		33.3%		13.9%	
Increased probability of combined head/chest AIS 4+ injury	0.70-o. 3 84 =3 1.6%				

Table5(c)
Injury Criteria and Excursion for 3-Year-Old Dummy 15 Degrees Offset Clock-wise

	HIC	AIS 4+	Chest G's	AIS 4+	Injury Prob.
Baseline	995	16.7%	48.5	26.1%	38.4%
S eatbelt Adjuster	1238	32.8%	45.4	22.1%	47.7%
Increased probability of injury		16.1%		-4.0%	
Increased probability of combined head/chest AIS 4+ injury	.474+.384 = 9.3%				

Table 6(a)
Injury Criteria and Excursion for 6-Year-Old Dummy Frontal

	HIC	AIS 4+	Chest G's	AIS 4+	Injury Prob.
Baseline	657	5.2%	50.4	28%	31.7%
Child Safer	769	7.9%	65.2	44.8%	49.2%
Increased probability of injury		2.7%		16.8%	
Increased probability of combined head/chest AIS 4+ injury	.492-.317=17.5%				

Table 6(b)
Injury Criteria and Excursion for 6-Year-Old Dummy Frontal

	HIC	AIS 4+	Chest G's	AIS 4+	Injury Prob.
Baseline	657	5.2%	50.4	28%	31.7%
SafeFit	427	2.0%	49.1	26.7%	28.2%
Increased probability of injury		-3.2%		-1.3%	
Increased probability of combined head/chest AIS 4+ injury	.282-.317=-3.5%				

Table 6(c)
Injury Criteria and Excursion for 6-Year-Old Dummy Frontal

	HIC	AIS 4+	Chest G's	AIS 4+	Injury Prob.
Baseline	657	5.2%	50.4	28%	31.7%
Seatbelt Adjuster	634	4.8%	50.8	28.4%	31.8%
Increased probability of injury		-0.4%		0.4%	
Increased probability of combined head/chest AIS 4+ injury	.318-.317= 0.1%				

Table 7(a)
Injury Criteria and Excursion for 6-Year-Old Dummy 15 degrees offset Clockwise

	HIC	AIS 4+	Chest G's	AIS 4+	Injury Prob.
Baseline	595	4.1%	54.3	32.0%	34.8%
Child Safer	947	14.3%	67.1	47.2%	54.8%
Increased probability of injury		10.2%		15.2%	
Increased probability of combined head/chest AIS 4+ injury	.548-.348=20.0%				

Table 7(b)

Injury Criteria and Excursion for 6-Year-Old Dummy 15 degrees offset Clockwise

	HIC	AIS 4+	Chest G's	AIS 4+	Injury Prob.
Baseline	595	4.1%	54.3	32.0%	34.8%
SafeFit	621	4.6%	57.7	35.8%	38.8%
Increased probability of injury		0.5%		3.8%	
Increased probability of combined head/chest AIS 4+ injury	.388-348=4.0%				

Table 7 (c)
Injury Criteria and Excursion for 6-Year-Old Dummy 15 degrees offset Clockwise

	HIC	AIS 4+	Chest G's	AIS 4+	Injury Prob.
Baseline	595	4.1%	54.3	32.6%	34.8%
Seatbelt Adjuster	794	8.6%	55.1	32.9%	38.7%
Increased probability of injury		4.5%		0.9%	
Increased probability of combined head/chest AIS 4+ injury	.387-348=3.9%				

Table 8(a)
Injury Criteria and Excursion for 6-Year-Old Dummy 15 degrees offset Counter-clockwise

	HIC	AIS 4+	Chest G's	AIS 4+	Injury Prob.
Baseline	409	1.9%	48.5	26.1%	27.5%
Child Safer	509	2.9%	50.1	27.6%	29.7%
Increased probability of injury		1.0%		1.5%	
Increased probability of combined head/chest AIS 4+ injury	.297-.275=2.2%				

Table 8(b)
Injury Criteria and Excursion for 6-Year-Old Dummy 15 degrees offset Counter-clockwise

	HIC	AIS 4+	Chest G's	AIS 4+	Injury Prob.
Baseline	409	1.9%	48.5	26.1%	27.5%
SafeFit	386	1.7%	42.8	21.0%	22.3%
Increased probability of injury		-0.2%		-5.1%	
Increased probability of combined head/chest AIS 4+ injury	.223-.275=-5.2%				

Table 8(c)
Injury Criteria and Excursion for 6-Year-Old Dummy 15 degrees offset Counter-clockwise

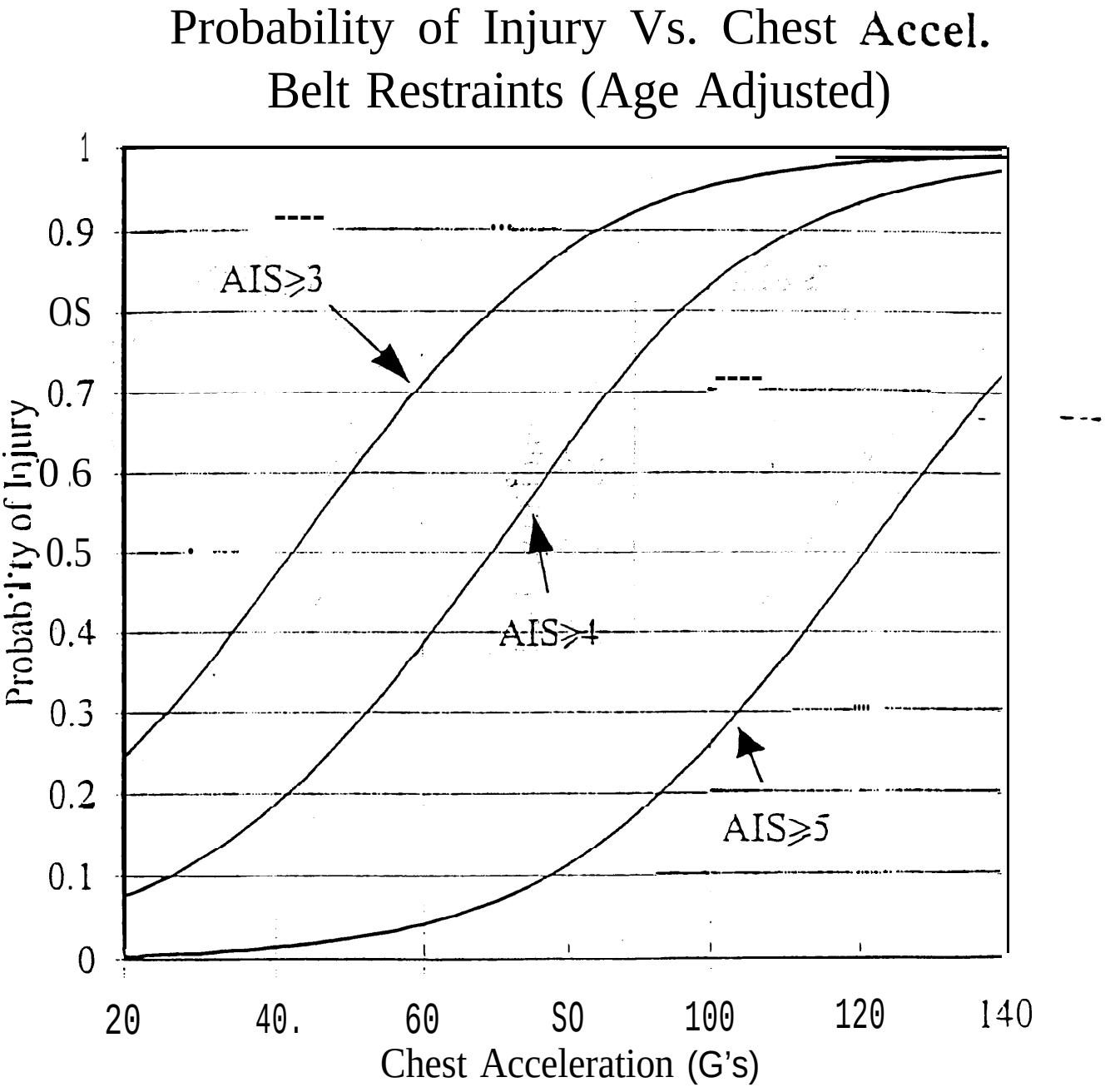
	HIC	AIS 4+	Chest G's	AIS 4+	Injury Prob.
Baseline	409	1.9%	48.5	26.1%	27.5%
Seatbelt Adjuster	374	1.6%	45.7	23.5%	24.7%
Increased probability of injury		-0.3%		-2.6%	
Increased probability of combined head/chest AIS 4+ injury	.247-.275=-2.8%				

Table 9

Probability of Injury for Belt Tests

accel	AIS>=5	AIS>=4	AIS>=3
0	0.001709	0.027904	0.105884
2	0.001909	0.030976	0.115996
4	0.002131	0.034364	0.126894
6	0.00238	0.038096	0.13861
8	0.002657	0.042204	0.151174
10	0.002966	0.046717	0.164614
12	0.003312	0.051669	0.178952
14	0.003697	0.057095	0.194204
16	0.004126	0.06303	0.210383
18	0.004605	0.06951	0.227492
20	0.005138	0.076574	0.245529
22	0.005733	0.084259	0.264481
24	0.006396	0.092603	0.284327
26	0.007134	0.101645	0.305035
28	0.007955	0.11142	0.326564
30	0.00887	0.121966	0.34886
32	0.009888	0.133315	0.371857
34	0.01102	0.1455	0.39548
36	0.012278	0.158549	0.419643
38	0.013676	0.172486	0.444247
40	0.015228	0.187331	0.469187
42	0.016951	0.203098	0.494351
44	0.018861	0.219795	0.519617
46	0.020977	0.237422	0.544865
48	0.023321	0.25597	0.569968
50	0.025912	0.275424	0.594804
52	0.028777	0.295755	0.619253
54	0.031938	0.316926	0.6432
56	0.035425	0.338889	0.666538
58	0.039265	0.361584	0.68917
60	0.043488	0.38494	0.711012
62	0.048127	0.408875	0.73199
64	0.053215	0.433296	0.752045
66	0.058786	0.458101	0.771131
68	0.064878	0.48318	0.789217
70	0.071526	0.508416	0.806282
72	0.078769	0.533687	0.82232
74	0.086644	0.558869	0.837336
76	0.095189	0.583839	0.851345
78	0.104443	0.608474	0.864369
80	0.114441	0.632657	0.87644
82	0.12522	0.656277	0.887594
84	0.136812	0.679233	0.897871
86	0.149246	0.701435	0.907317
88	0.162556	0.722805	0.915978
90	0.176759	0.743275	0.923902
92	0.191874	0.762795	0.931137
94	0.207914	0.781327	0.93773
96	0.224885	0.798846	0.943729
98	0.242784	0.815339	0.949177
100	0.261601	0.830807	0.95412
102	0.281316	0.84526	0.958597
104	0.301898	0.858717	0.962648
106	0.323308	0.871206	0.96631
108	0.345493	0.882762	0.969616
110	0.368391	0.893422	0.9726
112	0.391926	0.903231	0.975289
114	0.416014	0.912234	0.977711
116	0.440559	0.920479	0.979892
118	0.465456	0.928013	0.981855
120	0.490594	0.934835	0.983619
122	0.515853	0.941141	0.985205
124	0.541111	0.946828	0.98663
126	0.566244	0.951989	0.98791
128	0.591127	0.956668	0.989059
130	0.615641	0.960903	0.990091
132	0.639669	0.964733	0.991016
134	0.663104	0.968193	0.991846
136	0.685848	0.971316	0.99259
138	0.707812	0.974132	0.993258
140	0.728923	0.976669	0.993856

Figure 1


Probability of Injury Vs. Chest Accel.
Belt Restraints (Age Adjusted)
Probability of Injury
1
0.9
0S
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
AIS≥3
AIS≥4
AIS≥5
20
40.
60
SO
100
120
140
Chest Acceleration (G's)

Alternatives

NHTSA is proposing to require that seat belt positioning devices have a warning label notifying parents that these devices should not be used by children less than six years old. In general, safety belts alone should not be used with children less than six years of age. When children outgrow infants seats, the agency recommends that they should be restrained by a forward-facing child restraint rather than by the vehicle's seat belt. When a child outgrows a forward-facing convertible or toddler seat, he or she should use a child booster seat, which lifts and positions the child to fit a vehicle's lap and shoulder belt system or which has an internal shield or harness to provide pelvic and upper torso restraint. The booster seat should be used until the child is tall enough to wear the lap and shoulder belts properly without an accessory, and can sit comfortably on the vehicle seat with knees bent over the front of the seat when the child's back is against the vehicle seat back.

Another option under the same alternative is for manufacturers to label the devices not to be used by children less than a certain height (say four feet tall). The agency would have to determine the appropriate height. Height is closer to the belt fit problem than age, since children of a wide range of ages could have the same height. Another option could take into consideration belt fit. The devices could be labeled not to be used if the device causes the lap belt to ride up on the child's abdomen, or if the shoulder belt cuts across the child's neck or is pulled off the child's shoulder.

A second alternative is to specify performance requirements for dynamically testing these devices. However until new dummies are developed, the requirements would have to be based on tests using current dummies, which cannot test for abdominal injuries.

The agency believes that most of these devices are advertised as being suitable for children weighing 50 pounds or greater, which is approximately the weight of the 50th percentile 6-year-old male. AAP did not submit any information indicating that positioners are actually causing or exacerbating injuries. Standard 213 does not apply to devices recommended for children weighing over 50 pounds, which is the recommended weight range for the users of most, if not all, positioners. If the current requirements of Standard 2 13 were extended to such devices, there is some question of whether those requirements could effectively assess belt positioners due to the lack of abdominal instrumentation on the child dummies. If the current test procedure and injury criteria of Standard 213 were used to test and evaluate the devices, it appears that belt positioners would generally satisfy those criteria when tested with the 6-year-old dummy. Based on testing done at NHTSA's Vehicle Research Test Center, it is estimated to cost the manufacturer approximately $3,000 to test each device. The agency seeks comments on the practicability of requiring that these devices be tested to prove compliance with established injury criteria.

Benefits

Seat belt positioners can reconfigure the shoulder/lap belt to make the shoulder belt fit comfortably for differing heights of passengers and drivers in vehicles. Making shoulder belts more comfortable could increase belt usage, which leads to increased safety for occupants in the event of a crash. In a NHTSA survey "National Occupant Protection Use Survey: Controlled Intersection Study", Research Note, May 1, 1995, it was estimated that approximately 4.0 percent of passengers misuse seat belts, by either putting the shoulder portion of the lap/shoulder belt behind the back or under the arm.

However, there is a potential danger that seat belt positioners might lead to injuries from mispositioned belt webbing across the abdomen. Because of the scarcity of injury and usage data on seat belt positioners in crash records and the lack of abdominal instrumentation on test dummies, the agency cannot measure this potential currently.

Approximately 1.7 million units of seat belt positioners are sold annually. Unfortunately, there is no data available to estimate what portion of these devices are actually used, nor is there any data available to determine the injury profile of occupants that use these devices. This prohibits an actual analysis of the probable impact of these devices in occupant injuries and limits discussion to theoretical impacts.

For comfort reasons, some children put the shoulder portion of the lap/shoulder belt behind their backs. This causes a reduction in effectiveness of the seat belt. For passenger cars, preliminary NHTSA estimates show the fatality effectiveness of lap/shoulder belted back seat outboard occupants versus unrestrained back seat outboard occupants to be 44 percent. Similarly, the fatality effectiveness of lap belts versus unrestrained backseat outboard occupants is 32 percent. The fatality effectiveness of lap/shoulder belted occupants versus lap belted back seat outboard

occupants is approximately 15 percent. Thus, a result of putting the shoulder belt behind the back is a loss in effectiveness of approximately 15 percent. If seat belt positioners provide children with the needed comfort, such that some children use the seat belt positioner with the shoulder belt on their shoulder rather than behind their back, and do not cause any additional problems, then there would be an increase in child safety.

Based on the tests results summarized in Tables 6 thru 8, for the six year old dummy, positioners would improve safety beyond that supplied by just lap shoulder belts in some crash circumstances, but could degrade that level somewhat in others. However, when considering all crash conditions together, it is likely that lap shoulder belts with seat belt positioners would be preferable to not using the shoulder belt at all. Based on data in Tables 3 thru 5, positioners degrade injury protection for three-year-olds in all crash circumstances. To the extent that labeling prevents use of these devices with children three years old and younger, it would prevent this degradation and improve the child's chances of escaping injury.

Cost

Based on information provided in discussion with manufacturers, the range of consumer costs for a lap and shoulder-belt repositioning device is $5.00 to $20.00. There are approximately 1,700,000 units of these products sold annually. This proposal calls for the labeling of the device. The simplest design concept for the label is a pressure sensitive label, using an adhesive, which should cost manufacturers approximately $0.05 to $0.08 (1998 dollars)[4] per label. Given a markup of 2.37[5], the consumer cost would be approximately $0.12 to $0.19, for an annual total cost increase of between $204,000 and $323,000. Plastic devices could have the label molded right into the plastic at minimal cost.

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[4] Final Regulatory Evaluation, FMVSS No. 213 Warning Labels On Rear Facing Child Restraints For Vehicles With Air Bags, Office of Regulatory Analysis, Plans and Policy, page 24, January 1994.

[5] Ibid

Regulatory Flexibility Analysis

The Regulatory Flexibility Act of 1980 (Public Law 96-354) requires agencies to evaluate the potential effects of their proposed and final rules on small businesses, small organizations and small governmental jurisdictions.

Section 603 of the Act requires agencies to prepare and make available for public comment an initial regulatory flexibility analysis (RFA) describing the impact of proposed rules on small entities. Section 603(b) of the Act specifies the content of a RFA. Each RFA must contain:

- A description of the reasons why action by the agency is being considered;

- A succinct statement of the objectives of, and legal basis for, the proposed rule;

- A description of and, where feasible, an estimate of the number of small entities to which the proposed rule will apply;

- A description of the projected reporting, record keeping and other compliance requirements of a proposed rule including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record;

- An identification, to the extent practicable, of all relevant Federal rules which may duplicate, overlap or conflict with the proposed rule.

- Each regulatory flexibility analysis shall also contain a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable

statutes and which minimize any significant economic impact of the proposed rule on small entities.

1. Description of the reasons why action by the agency is being considered

NHTSA is considering two alternatives. The first is to require seat belt positioners to be labeled as not suitable for children of a certain age, i.e., under six years old. The second is to require sled testing of these devices. The agency is taking this action to ensure that products that are sold to the public are safe for the group for which they are marketed.

2. Objectives of and legal basis for, the final rule

The objective of the proposal is to minimize the risk of injury to children or adults who use aftermarket seat belt positioning devices.

NHTSA has issued this ANPRM under the authority of 49 U.S.C. 322, 30111, 30115, 30117 and 30166; delegation of authority at 49 CFR 1.50. The agency is authorized to issue Federal motor vehicle safety standards that meet the need for motor vehicle safety and consumer information regulations.

3. Description and estimate of the number of small entities to which the proposed rule will apply

A proposed rule would affect seat belt positioning devices manufacturers, almost all of which would qualify as small businesses. It is believed that a proposed rule could have two effects on the sale of these devices. First, it could narrow the market group for which these devices can be sold by recommending against use by children less than 6 years of age. However, the agency

believes that a proposed rule could have an overall positive effect on seat belt positioning device sales, because the public might believe that the product is safe for individuals over six years of age. The agency is asking for comments on the impact of labeling on manufacturers' sales. Would seat belt positioning device manufacturers be adversely affected by such a rule? For example, would labeling increase the cost to manufacturers? If the labeling of the product results in increased sales, would the increase in sales compensate for the increase in costs? Would requiring aftermarket seat positioning devices to meet a sled test result in significant economic impact on these small manufacturers? Do the manufacturers already do sled testing? Would testing require changes in design?

Business entities are generally defined as small businesses by Standard Industrial Classification (SIC) code, for the purposes of receiving Small Business Administration assistance. One of the criteria for determining size, as stated in 13 CFR 12 1.601, is the number of employees in the firm. There is no separate SIC code for child restraints, or even a category that they fit into well. However, in order to qualify as a small business in all of the SIC codes that the child restraint manufacturers currently are listed under, including those business ventures other than child restraints, in the Standard and Poor's Register of Corporations, Directors and Executives, 1995, the firm must have fewer than 500 employees. In addition, to qualify as a small business in the Motor Vehicle Parts and Accessories category (SIC 3714), the firm must have fewer than 500 employees. Thus, it is safe to assume that any seat belt positioner device manufacturer with fewer than 500 employees would be considered a small business. One of the seat belt positioner manufacturers is a subsidiary of a larger corporation. In this case, the total employees of the corporation are considered in relation to the 500 employee limit to qualify as a small business. From Table 10, seven of the eight known manufacturers of seat belt positioners would qualify as small manufacturers.

TABLE 10

Employment of Seat Belt Positioner Manufacturers
(less than 500 employees qualifies as a small business)

Manufacturer	Number of Employees
Axius Auto-Shade	< 10
Blue Ridge	< 10
Bodyguard	< 10
Gerry Baby Products, a division of Spalding & Evenflo Company Inc., which has 2,600 employees,	2,600
Master Design	< 10
Millennium Products	< 15
Redlog Products Inc.	< 10
Westech Group.	<10

4. Description of the projected reporting, record keeping and other compliance requirements for small entities

Under one alternative, seat belt positioning device manufacturers would have to label their products with words that comply with the proposed requirements. If the alternative chosen includes sled testing, then there would be compliance and certification requirements for some small entities. There are no reporting, or record keeping requirements proposed.

5. Duplication with other Federal rules

There are no relevant Federal rules which may duplicate, overlap or conflict with the proposed rule.

6. Description of any significant alternatives to the proposed rule

The agency requests comments on alternatives to a labeling proposal which would minimize any significant economic impact of the proposed rule on small entities.

NHTSA estimates that a labeling requirement would add $0.05 to $0.08 to the manufacturer's cost depending on the type of label used, and the added estimated consumer costs for the device is expected to range from $0.12 to $0.19. The cost increase would not significantly raise the price of seat belt positioners, and would not have a significant economic impact on a substantial number of small businesses.

Under a sled test alternative, if the manufacturers do not currently test their product, or if the final proposal were to require changes in product design to certify compliance then the proposal could result in significant economic impact on a substantial number of small businesses.

Cumulative Impact of Regulations

Since these manufacturers are not regulated by Federal Motor Vehicle Safety Standards currently, there is no cumulative impact of regulations.